BRITISH STANDARD

BS EN 1119:2009

Plastics piping systems — Joints for glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leaktightness and resistance to damage of non-thrust resistant flexible joints with elastomeric sealing elements

ICS 23.040.20; 23.040.60

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 1119:2009. It supersedes BS EN 1119:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/88/2, Plastics piping for pressure applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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English Version

Plastics piping systems - Joints for glass-reinforced thermosetting plastics (GRP) pipes and fittings - Test methods for leaktightness and resistance to damage of non-thrust resistant flexible joints with elastomeric sealing elements

Systèmes de canalisations plastiques - Assemblages pour tubes et raccords en plastique thermodurcissable renforcé de verre (PRV) - Méthodes d'essai d'étanchéité et de résistance à l'endommagement des assemblages flexibles non résistants à la poussée avec bagues d'étanchéité en élastomère

Kunststoff-Rohrleitungssysteme - Verbindungen für Rohre und Formstücke aus glasfaserverstärkten duroplastischen Kunststoffen (GFK) - Prüfverfahren zur Dichtheit und Widerstandsfähigkeit gegen Beschädigung von nicht druckbeständigen flexiblen Verbindungen mit elastomeren Dichtungselementen

This European Standard was approved by CEN on 8 February 2009.

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Foreword

This document (EN 1119:2009) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1119:1996.

The modifications are:

— changed title and scope to remove “reduced articulation” and clarify intent;

— changed testing sequence from mandatory to suggested;

— clarified support conditions and requirements.

The material-dependent test parameters and/or performance requirements are incorporated in the referring standard.

This standard is one of a series of standards on test methods which support System Standards for plastics piping systems and ducting systems.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies test methods for flexible non-thrust resistant socket-and-spigot joints with elastomeric sealing elements for buried and above ground glass-reinforced thermosetting plastics (GRP) pipeline applications. It covers methods of test for the leaktightness and resistance to damage of the joint only, when subject to specified combinations of longitudinal extension (draw), angular movement (angular deflection), compression (misalignment) perpendicular to the pipe axis and internal pressure. This European Standard is applicable to joints for either pressure or non-pressure applications.

NOTE The joints tested in accordance with this European Standard are subjected to conditions which measure their ability to function and thereby prove the design of the joint, especially for type test purposes.

These test procedures are applicable to joints for pipes and fittings of all nominal sizes. The tests are suitable for the evaluation of joints intended for applications in which the liquids are conveyed at temperatures specified in the referring standards.

2 Principle

A test piece comprising two pieces of pipe jointed together, by incorporation of a socket or inclusion of a double-socket coupler, is subjected to specified combinations of draw, angular deflection and misalignment. In each specified combination the test piece is subjected to a series of test pressures for specified periods of time, including an internal sub-atmospheric test pressure.

In addition, joints for pressure applications are subjected to a specified cyclic pressure test.

When under pressure, the joint is monitored for leakage.

Between each test condition (see Table 1 and Table 2) the joint is inspected for signs of damage.

NOTE It is assumed that the following test parameters are set by the standard making reference to this European Standard:

a) the nominal size of the components to be connected by the joint (see 4.1);

b) the pressure class of the components (see 4.1);

c) the total effective length, L, of the test piece (see 4.1);

d) the number of test pieces (see 4.2);

e) if applicable, the conditioning to be applied (see Clause 5);

f) the test temperature (see Clause 6);

g) sequence of testing, if appropriate (see 7.1);

h) the joint positions (see Table 1 and Table 2);

i) the draw, angular deflection (see 7.2.3) and the force F (see 7.3.5);

j) the permissible change in negative pressure (see 7.5.4).

3 Apparatus

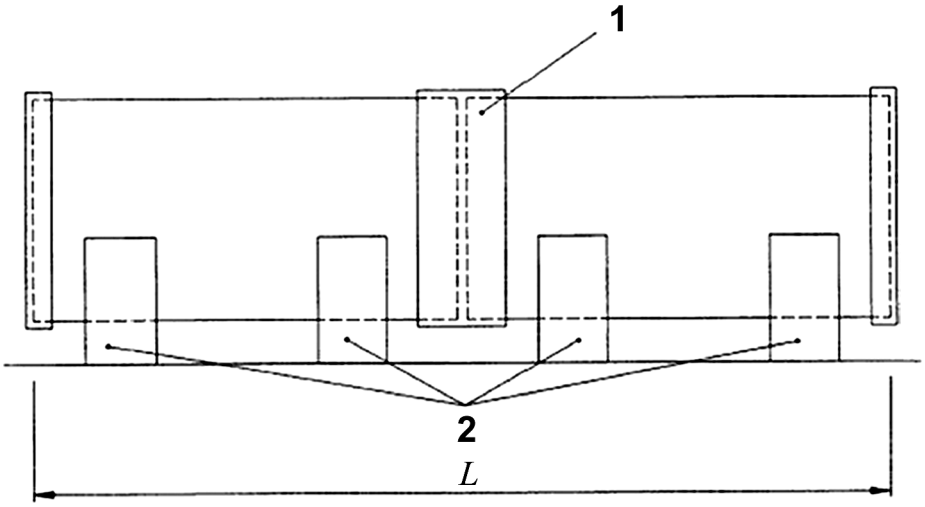
3.1 End sealing devices, of sizes and type appropriate to the components under test, anchored to take the axial end thrust and permit free longitudinal movement.

3.2 Supports and restraints

3.2.1 Straps or cradles, (100 ± 5) mm wide supporting an 180° arc of the pipe barrel or of the socket (see Figure 1).

The use is as follows:

a) **support R** [see Figure 1b) and Figure 2b)], positioned at least 500 mm from the spigot end of the pipe at the point of balance (see Figure 1) to provide support during testing with misalignment; cradles shall be provided close to the ends of the pipe during testing with angular deflection and draw [see Figure 1a) and Figure 2a)];

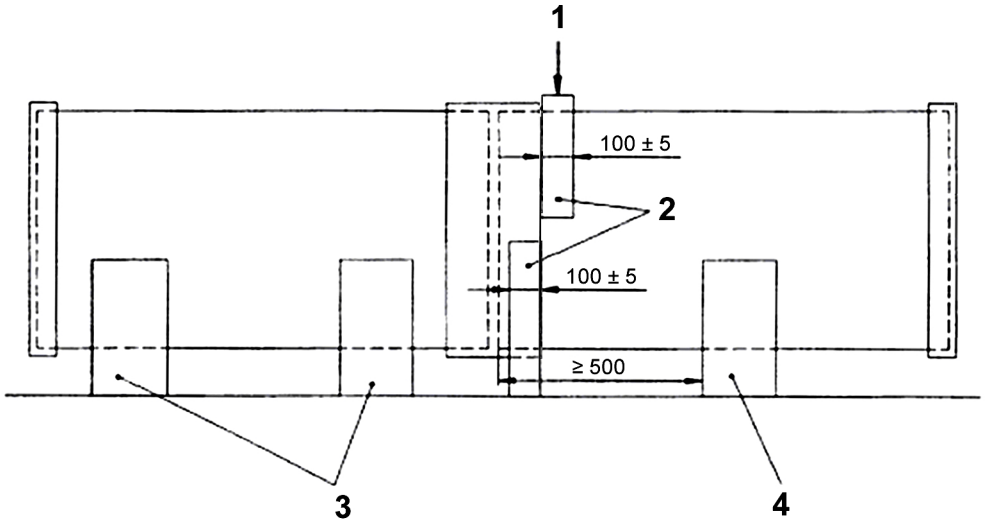


Key

1 socket (or double socket coupler)
2 supports

a) Arrangement for angular deflection and draw

Dimensions in millimetres

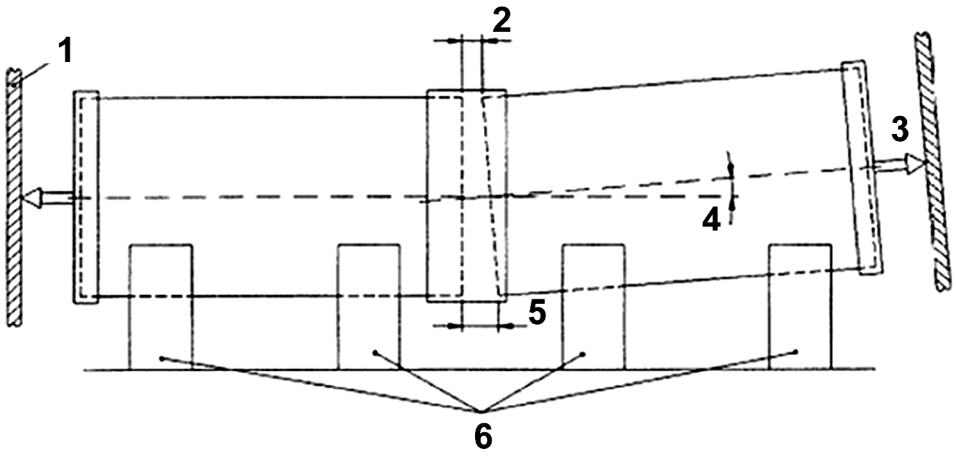


Key

1 additional force $F = 20 \times [DN]$
2 straps or cradles
3 supports
4 support R

b) Arrangement for misalignment and draw

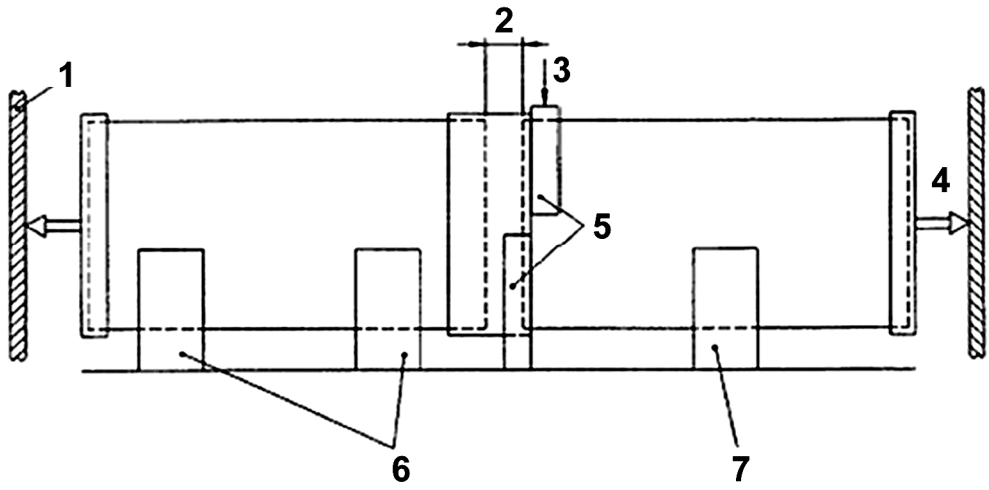
Figure 1 — Test arrangement before testing (see 3.2.1)



Key

1 rig
2 draw
3 end trust carried by rig
4 angular deflection
5 total draw
6 supports

a) Joint position for angular deflection and draw



Key

1 rig
2 total draw
3 force *F*
4 end trust carried by rig
5 straps or cradles
6 supports
7 support R

b) Joint position for misalignment and draw

Figure 2 — Joint positions during testing for arrangements shown in Figure 1 (see 3.2.1)

NOTE Figures 1 and 2 show the loading on the test assembly applied in a vertical plane. This is only for purposes of illustration and the loading and supports can be in any orientation.

b) **a cradle**, to support the socket on a fixed base, as required for misalignment testing (see 7.3);

c) **a strap or cradle**, positioned adjacent to the end of the joint being tested [see Figure 1b) and Figure 2b)], through which the force *F* necessary for misalignment testing (see 7.3) can be applied;

d) **supports**, for the pipe components of the test piece (see 4.1 and Figures 1 and 2). These can be used to apply angular deflection [see 7.2 and Figure 2a)]. They shall allow misalignment to occur [see 7.3, 7.4, 7.5 and Figure 2b)].

The straps or cradles shall not have a detrimental effect on the test piece, e.g. point loads.

3.2.2 Longitudinal supports, capable of supporting the end thrust induced by the internal pressure but which shall not otherwise support the joint (see Figure 2).

3.2.3 Special supports, if necessary to prevent buckling of the pipe barrel of low stiffness pipe during negative pressure testing.

3.2.4 Special restraints, to provide support for the test assembly to prevent uncontrolled movements, particularly when testing at high pressures. Such supports shall be positioned in a manner so as to not influence the test being conducted and shall not induce point loads.

3.3 Means for applying the required force (see Clause 7) and **means for measurement of the applied force** to an accuracy of ±5 %.

3.4 Source of hydrostatic pressure, capable of applying the required pressures including, as necessary, pressure cycling controls (see Table 1).

3.5 Vacuum pump, capable of applying the required negative pressure (see 7.5.3 and Table 1).

3.6 Pressure gauges, capable of measuring the positive and negative pressures at the top of the pipe to an accuracy of ± 2 %.

4 Test pieces

4.1 Assembly

The test piece shall comprise an assembly of two pieces of pipe of the same nominal size and pressure class, as specified in the referring standard, jointed by the socket/spigot, or double-socket, joint to be tested. In some cases it can be desired to test a transition coupling capable of joining two different nominal pipe sizes. In such a case both sides of the transition coupling shall satisfy the test requirements.

The total effective length, *L*, (see Figure 1a)) of the test piece shall be not less than that specified in the referring standard.

The joint under test shall be assembled in accordance with the manufacturer's recommendations.

4.2 Number

The number of test pieces shall be as specified in the referring standard.

5 Conditioning

Unless otherwise specified by the referring standard, the test piece need not be conditioned.

6 Test temperature

Conduct the tests at the temperature specified in the referring standard.

7 Procedure

7.1 General

Subject a test piece (see 4.1) to the tests specified in the referring standard and as given in Table 1 and Table 2 and in 7.2, 7.3, 7.4 and 7.5. Each reference to hydrostatic pressure specifies an internal pressure, relative to atmospheric pressure, expressed as multiples of the nominal pressure, [PN], that is relevant to the joint under test.

If a test is interrupted, record the fact in the test report and repeat the particular test before carrying on to the next in the series of tests. Failure at the end sealing devices shall not constitute failure of the joint. If the test conditions are invalidated thereby, repeat the particular test thus affected, after replacing the end sealing device as necessary. The sequence of testing as given in 7.2, 7.3, 7.4 and 7.5 and in Table 1 and Table 2 is typical but the tests may be conducted in any sequence.

WARNING – It is necessary to take account of the consequences of failure of the components under pressure and/or, vacuum and to contain the test piece or apparatus accordingly. Care should be taken to provide suitable protection from flying objects resulting from catastrophic failure or movement of the test assembly. Any National Health and Safety standards shall be satisfied.

7.2 Simultaneous angular deflection and draw

7.2.1 Assemble the test arrangement as shown in Figure 1a).

7.2.2 Connect the test piece (see 4.1) to the source of hydrostatic pressure (see 3.4).

7.2.3 Apply the draw plus the angular deflection, as specified in the referring standard, to obtain the total draw as shown in Figure 2a).

7.2.4 Fill the test piece with water and vent to remove any air.

7.2.5 Apply and maintain for at least 15 min the initial pressure specified in Table 1 or Table 2, as applicable. Inspect the joint for signs of leakage or damage. If neither are present, continue in accordance with 7.2.6. Otherwise depressurize the test piece and record the observations in accordance with Clause 8.

7.2.6 Apply the positive static pressure specified in Table 1 or Table 2, as applicable, for the time specified.

7.2.7 Inspect the joint for signs of leakage or damage and then depressurize. If there are no signs of leakage or damage, continue in accordance with 7.3. Otherwise record the observations in accordance with Clause 8.

7.3 Simultaneous draw and misalignment

7.3.1 Assemble the test arrangement as shown in Figure 1b), using supports (see 3.2) and straps or cradles (see 3.2.1) as appropriate and reconnect in accordance with 7.2.2, if necessary.

7.3.2 Apply the draw conditions specified in the referring standard.

7.3.3 Fill the test piece with water and vent to remove any air.

7.3.4 Apply the initial pressure specified in Table 1 or Table 2, as applicable, for the time specified.

7.3.5 Apply the force *F*, as specified in the referring standard, to the test piece as shown in Figure 2b).

7.3.6 Inspect the joint for signs of leakage or damage. If none are present proceed in accordance with 7.3.7. Otherwise record the observations in accordance with Clause 8.

7.3.7 Increase the pressure to the appropriate static pressure for the joint as specified in Table 1 or Table 2, as applicable, and maintain that pressure for the time specified.

7.3.8 Inspect the joint for signs of damage or leakage. If neither are present proceed if a pressure joint in accordance with 7.4, or 7.5 if a non-pressure joint. Otherwise record the observations in accordance with Clause 8.

7.4 Cyclic pressure

7.4.1 Reduce the internal pressure to atmospheric pressure.

7.4.2 In a period of 1,5 min to 3 min, raise the pressure to the level specified in Table 1 and lower it to atmospheric pressure.

7.4.3 Unless any leakage or damage is clearly apparent, repeat the cycle given in 7.4.2 a further nine times.

7.4.4 Inspect the joint for signs of leakage or damage. If neither are present proceed in accordance with 7.5. Otherwise record the observations in accordance with Clause 8.

7.5 Negative pressure

7.5.1 Remove the force *F*. Depressurize and empty the test piece.

7.5.2 Ensure that the draw applied is still in accordance with 7.3.

7.5.3 Apply vacuum to a negative pressure of at least −0,8 bar (−0,08 MPa) gauge pressure (i.e. approximately 0,2 bar absolute), seal and leave for not less than 1 h.

7.5.4 Measure and record any change in pressure and compare the result with the requirement of the referring standard.

7.5.5 Return the pressure to atmospheric pressure.

7.5.6 Inspect the joint for and record any observations of damage.

Table 1 — Summary of test conditions for evaluating joints for pressure applications

Joint position	Tests	Minimum test pressure	Minimum duration
Angular deflection and draw	Initial pressure	1,5 × [PN]	15 min
	Positive static pressure	2 × [PN]	24 h
Misalignment and draw	Initial pressure	1,5 × [PN]	15 min
	Positive static pressure	2 × [PN]	24 h
	Positive cyclic pressure	Atmospheric to 1,5 × [PN] to atmospheric	10 cycles of 1,5 min to 3 min each
Total draw	Negative pressure [a]	−0,8 bar (−0,08 MPa)	1 h
[a] Relative to atmospheric pressure, i.e. approximately 0,2 bar (0,02 MPa) absolute.			

Table 2 — Summary of test conditions for evaluating joints for non-pressure applications

Joint position	Tests	Minimum test pressure	Minimum duration
Angular deflection and draw	Initial pressure	1,5 bar	15 min
	Positive static pressure	2 bar	24 h
Misalignment and draw	Initial pressure	1,5 bar	15 min
	Positive static pressure	2 bar	24 h
Total draw	Negative pressure [a]	−0,8 bar (−0,08 MPa)	1 h
[a] Relative to atmospheric pressure, i.e. approximately 0,2 bar (0,02 MPa) absolute.			

8 Test report

The test report for each test piece shall include the following information, as applicable:

a) a reference to this European Standard, and the referring standard;

b) full identification of the pipes and joint tested;

c) the nominal pressure class, PN, of the pipe(s) and joint;

d) details of the jointing procedures and, if applicable, the lubricant used;

e) details of any conditioning, if applicable (see Clause 5);

f) the temperatures during the test;

g) the test conditions to which the test piece was subjected and their sequence;

h) details of interruptions, if any;

i) the draw applied to the joint;

j) the angular deflection applied to the joint;

k) the total draw derived from i) and j);

l) the misalignment force applied;

m) the pressure applied at each stage;

n) observations on the leaktightness of the joint during each test;

o) observations of signs of damage to the joint components after each test;

p) any factors which could have affected the results, such as any incidents or any operating details not specified in this standard;

q) the dates of the test.

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